

Introduction to UVB and reptiles, part 1

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Introduction to UVB, part 1:

What is UVB, and Why is it Important to Reptile Husbandry?

Guest post written by ReptiFiles for use by The Bio Dude

Among experts, you can't talk about reptiles for very long without bringing up UVB. And yet despite this essential component of reptile husbandry, there's still a lot of misunderstandings and misinformation about it. The only way to get past confusion and misinformation on any topic is by seeking to understand how it works, so in this two-part article we're going to talk about the basics of UVB: what it is, why it matters, and how to utilize it better in your own husbandry.

What is UVB?



When you think about our Sun, what comes to mind? If you're like most, probably bright light, intense summer heat, and sunburns. But it's more complicated than that. As a blazing ball of nuclear fusion reactions, the Sun produces many different forms of energy, including little energy particles called *photons*. Photons move in waves at different speeds, and their speed determines how much energy they carry and how they function. This is called *the electromagnetic spectrum*:

- Radio waves
- Microwaves
- Infrared light
- Visible light
- Ultraviolet light
- X-rays
- Gamma rays

As reptile keepers, we are most interested in infrared (heat), visible light (daylight), and ultraviolet light.

Infrared

Of the three, infrared is the lowest-energy wavelength. Humans can't see infrared, and most reptiles can't either, but we all feel it as heat. There are 3 types of infrared: IR-A, IR-B, and IR-C.

- **IR-A**— Highest in energy. This is the primary type of infrared produced by the Sun, and penetrates deepest into surfaces like animal tissues. That deep, “ahhh” feeling you get when you step out into the sun on a nice day? That’s IR-A at work.
- **IR-B**— Contains a medium amount of energy. This is the secondary type of infrared produced by the Sun, and penetrates surfaces well, but not quite as deeply as IR-A.
- **IR-C**— Lowest in energy and does not penetrate very deeply into surfaces, if at all. IR-C is actually not produced by the Sun. It’s actually a byproduct produced when IR-A and IR-B wavelengths have come in contact with a surface that has absorbed some of their energy. This is the ambient heat you feel on hot asphalt or a warm summer night.

I’d love to go more into detail on this subject, as proper reptile heating is even more important than proper reptile lighting, but this is an article on UVB, not heat, so we’ll leave that for another day.

Visible light

Visible light is the range of wavelengths that humans perceive as light and color, between 400-700nm. The exact wavelength of visible light is what we perceive as different colors of light, which is measured in Kelvin. It is also associated with the light’s intensity, or brightness. Artificial light sources generally range from about 1,900K (dim and warm) to 10,000K (extremely bright and blue). Many consider 6500K to be optimal for best plant growth and truest color perception.

Ultraviolet light

Ultraviolet is the highest-energy wavelength that we regularly use as reptile keepers, and completely invisible to humans. Like infrared, UV is broken down into 3 distinct categories: UVA, UVB, and UVC.

- **UVA**— With a wave length of 315-400nm, UVA is a low-energy form of ultraviolet. This light is invisible to humans, but it is visible to some animals, including reptiles. UVA can pass through glass and clear plastic.
- **UVB**— With a wave length of 280-315nm, UVB is a high-energy form of ultraviolet. It is partially filtered by Earth’s atmosphere and is blocked by glass and plastic. It can damage cellular DNA with prolonged exposure, causing sunburn in humans. It is also essential to the process of vitamin D synthesis and metabolism in many animals, including humans and reptiles.
- **UVC**— With a wave length of about 180-280nm, UVC is the highest-energy form of ultraviolet. This wavelength destroys DNA on contact, and would destroy all life on Earth if it weren’t completely filtered out by our atmosphere. For this reason, artificial UVC-emitting lights are often used for disinfecting in devices such as toothbrush cleaners and air purifiers. This process is known as “irradiation,” and no, it doesn’t turn foods or objects radioactive.



Why is UVB so crucial to captive reptile husbandry?

Although UVA is important to many aspects of reptile life and shouldn't be ignored, it is always included in artificial UVB lamps, and again for the sake of brevity we have to focus on UVB from this point.

As mentioned in the previous section, UVB (combined with heat) is required for the creation of vitamin D, and in turn, it is required for the healthy function of many associated metabolic processes. After getting processed into its usable form by the liver, vitamin D plays essential roles in a reptile's brain, heart, lungs, kidneys, bones, immune system, and digestive system.

Additionally, UVB exposure plays an important role in boosting immune response, stimulating beta endorphin production, and increasing pigmentation (color).

UVB lamps are expensive. Why not just give them vitamin D in their food?

1. Because "homemade" vitamin D is more available for the reptile's body to use, and thus more effective. In one study, corn snakes exposed to UVB had higher (read: healthier) levels of vitamin D than those which had no UVB lighting and only received vitamin D from their food.
2. Because it's too easy to overdose or underdose supplementary vitamin D. Unlike with humans (and even that understanding could still use some work), we don't have enough data on the exact amounts of vitamin D that each reptile species requires per gram of weight at each stage of life. Vitamin D is toxic in large amounts, causing a variety of

severe symptoms, including kidney damage, calcification of soft tissues, and premature death. Underdose results in the softening of bones, malfunction of the digestive tract, nerve damage, and premature death.

3. Because cellular vitamin D production is self-regulating, so when adequate UVB lighting is provided, it is impossible for a reptile to develop a vitamin D deficiency or toxicity. The reptile creates exactly the amount of vitamin D that its body needs.

But isn't UVB dangerous since it causes sunburns and cancer in humans?

A lot of people think of UVB as a bad thing because it causes sunburns, and the associated cellular damage can lead to skin cancer (thanks propaganda!). But humans *need* UVB.

The Sun is one of the essential elements that makes life on Earth possible, and all life has evolved in varying responses to the availability of this resource, protecting themselves from the bad while making use of the good. Reptiles evolved scales, birds have feathers, cats and dogs have hair, and humans have...well, we exchanged our body hair for clothes.

Most humans in the US are vitamin D deficient because we're indoors all day and anti-skin cancer propaganda has us afraid to go out in the sun without sunscreen. Vitamin D pills help, but studies are indicating that we need way more vitamin D than previously thought in order to replace sunlight. If roles were reversed and reptiles were keeping pet humans, we would need artificial UVB lighting too.

Furthermore, reptiles will also move into the shade when sunlight gets too intense or they've had their fill. Even sun-loving lizards like bearded dragons, chuckwallas, and uromastix do most of their basking early in the morning and then find a hiding place by midday when the sun is at its strongest.

But some reptiles don't need UVB, right?

Wrong!

If you keep snakes or crepuscular lizards like crested geckos or leopard geckos, you may have heard people emphatically assert that these species "don't need UVB," that it's a "waste of money," that it "hurts their eyes," etc.

This is a **very** outdated approach, and more folklore husbandry than scientific fact. In fact, a mounting number of modern studies are proving the benefits of providing UVB to captive species that don't ordinarily get UVB. Remember the corn snake study I referred to earlier? That's just the tip of the iceberg.

Outside of formal research, many reptile keepers have observed daytime basking behavior in nocturnal species that have been provided with UV lighting. Although they may not bask as openly as bearded dragons and red-eared sliders, they will cryptically bask by strategically exposing parts of their bodies to UV while keeping the rest hidden. This is a strategy evolved in

the wild to help them get benefits from sunlight without making themselves vulnerable to predators.

When in doubt, keep in mind that all reptiles are exposed to the sun at some point or other in their natural habitat. Even those that seem to spend most of their time in holes or caves are indirectly exposed to small amounts of beneficial sunlight that reflects off rocks and other surfaces in the environment and into their hiding space.

I should acknowledge here that albino, thin-scaled morphs, and other reptiles with reduced or no pigmentation are more sensitive to UVB as well as visible light, and will need exposure reduced accordingly. They don't need the same amount of UVB to get the same benefit. Normal levels of light and UVB can lead to sunburn, blindness, and cancer in these animals.



About the author: *Mariah Healey has been passionate about animal research from a young age. Today, she is a reptile husbandry specialist and the author of [ReptiFiles.com](https://reptifiles.com), where she publishes her findings on the best practices in modern reptile care. ReptiFiles is the most comprehensive, accurate source of reptile care on the internet, boasting 15 science-based guides to date, with two more in active development.*